CLAIMS

What is claimed is:

1. A color lighting system, comprising:

a light source to emit light;

a color beam separator separating incident light emitted from the light source according to predetermined wavelength bands and transmitting the separated beams at different angles;

a first condensing lens condensing the separated beams; and

a scrolling unit changing travel paths of the condensed beams in color bars at different locations, and scrolling the changing of the travel paths of the condensed beams so as to periodically scroll the color bars.

2. The color lighting system of claim 1, wherein the color beam separator comprises:

a first dichroic mirror, inclined to the optical axis of light incident to the color beam separator, reflecting a first color beam of the incident light and transmitting the remaining color beams;

a second dichroic mirror, inclined to the optical axis of the incident light and disposed behind a back surface of the first dichroic mirror, reflecting a second color beam of the color beams transmitted by the first dichroic mirror, and transmitting the remaining color beam; and

a third dichroic mirror, inclined to the optical axis of the incident light and disposed behind a back surface of the second dichroic mirror, and reflecting a third color beam of the color beams transmitted by the second dichroic mirror.

3. The color lighting system of claim 2, wherein the first, second, and third dichroic mirrors are inclined at different angles to the optical axis of the incident light, and the light exiting the first, second, and third dichroic mirrors is incident on the first condensing lens at different angles.

4. The color lighting system of claim 3, wherein the angle of inclination for the first dichroic mirror is less than the angle of inclination for the second dichroic which is less than the angle of inclination for the third dichroic mirror.

5. The color lighting system of claim 1, wherein the first condensing lens is a cylindrical lens for selectively condensing light incident on the first condensing lens, only along particular incidence paths.

6. The color lighting system of claim 1, wherein the first condensing lens is a diffraction optical element, having a predetermined diffraction pattern, so as to selectively condense light incident on the first condensing lens, only along particular incidence paths.

7. The color lighting system of claim 1, wherein the scrolling unit comprises:

a first cylindrical array lens, including a plurality of adjacently disposed cylindrical lenses converging and diverging light, incident on the first cylindrical array lens, independently; and

a first driving unit providing a driving force to scroll light exiting the first cylindrical array lens and reciprocatingly-drive the first cylindrical array lens in a direction perpendicular to an optical axis of the incident light.

8. The color lighting system of claim 7, wherein the scrolling unit further comprises:

a second cylindrical array lens, separated from the first cylindrical array lens, including a plurality of adjacently disposed cylindrical lenses converging or diverging light, incident on the second cylindrical array lens, independently; and

a second driving unit providing a driving force to reciprocatingly-drive the second cylindrical array lens in a direction perpendicular to the optical axis of the light incident on the second cylindrical lens.

9 The color lighting system of claim 8, wherein each of the first and second cylindrical array lenses is a diffraction optical element, forming the plurality of cylindrical lenses using a diffraction pattern.

10. The color lighting system of claim 1, wherein the scrolling unit comprises:

a turning cylinder array lens, rotatably disposed along an optical path of light, incident on the scrolling unit, including a plurality of adjacently disposed cylindrical lenses, along an outer circumference portion of the turning cylinder array lens, having a cylinder shape; and

a driving unit rotatably driving the turning cylinder array lens.

11. The color lighting system of claim 10, wherein the turning cylinder array lens is a diffraction optical element, forming the plurality of cylindrical lenses, using a diffraction pattern.

12. The color lighting system of claim 1, further comprising:

a second condensing lens condensing the light exiting the scrolling unit; and

a uniform light forming unit making the light exiting the scrolling unit uniform light.

13. The color lighting system of claim 12, wherein the second condensing lens is a cylindrical lens for selectively condensing incident light, incident on the second condensing lens, only along particular incidence paths.

14. The color lighting system of claim 12, wherein the second condensing lens is a diffraction optical element, having a predetermined diffraction pattern, for selectively condensing incident light, incident on the second condensing lens, only along particular incidence paths.

15. The color lighting system of claim 12, further comprising a relay lens transferring the light passing through the uniform light forming unit to a predetermined position.

16. The color lighting system of claim 12, wherein the uniform light forming unit comprises:

a first fly eye lens having a plurality of convex portions, two-dimensionally arranged on an incident surface and/or an emitting surface of the light uniform light forming unit; and

a second fly eye lens, disposed adjacent to the first fly eye lens, having a plurality of convex portions, two-dimensionally arranged on the incident surface and/or the emitting surface of the uniform light forming unit.

17. The color lighting system of claim 1, wherein the predetermined wavelength bands consist of three separate predetermined wavelength bands for three separate colors.

18. An image projection system, comprising:

a light source emitting light beams;

a color beam separator separating incident light beams, emitted from the light source, according to predetermined wavelength bands and transmitting the separated beam at different angles;

a first condensing lens condensing the separated beams;

a scrolling unit changing travel paths of the condensed beams to form color bars at different locations and scrolling the changing of the travel paths of the condensed beams so as to periodically scroll the color bars;

a second condensing lens condensing light exiting the scrolling unit;

a uniform light forming unit transforming the light exiting the scrolling unit into uniform light;

an image forming device forming an image from light exiting the uniform light forming unit; and

a projection lens unit magnifying and projecting the image produced from the image forming device onto a screen.

19. The image projection system of claim 18, wherein the color beam separator comprises:

a first dichroic mirror, inclined to an optical axis of light incident on the color beam separator, reflecting a first color beam of the incident light and transmitting the remaining color beams;

a second dichroic mirror, inclined to the optical axis of the incident light and disposed behind a back surface of the first dichroic mirror, reflecting a second color beam of the color beams transmitted by the first dichroic mirror and transmitting the remaining color beam; and

a third dichroic mirror, inclined to the optical axis of the incident light and disposed behind a back surface of the second dichroic mirror, reflecting a third color beam of the color beams transmitted by the second dichroic mirror.

20. The image projection system of claim 19, wherein the first, second and third dichroic mirrors are inclined at different angles to the optical axis of the incident light, and light exiting the first, second, and third dichroic mirrors is incident on the first condensing lens at different angles.

21. The image projection system of claim 20, wherein the angle of inclination for the first dichroic mirror is less than the second angle of inclination for the second dichroic which is less than the angle of inclination for the third dichroic mirror.

22. The image projection system of claim 18, wherein the first and second condensing lenses are cylindrical lenses for selectively condensing respective incident light beams, incident on the corresponding condensing lens, only along particular incidence paths.

23. The image projection system of claim 18, wherein each of the first condensing lens and second condensing lenses are diffraction optical elements having predetermined diffractions pattern so as for selectively condensing respective incident light beams, incident on the corresponding condensing lens, only along particular incidence paths.

24. The image projection system of claim 18, wherein the scrolling unit comprises:

a first cylindrical array lens, including a plurality of adjacently disposed cylindrical lenses converging or diverging light, incident on the first cylindrical array lens, independently; and

a first driving unit providing a driving force for scrolling light exiting the first cylindrical array lens and for reciprocatingly-driving the first cylindrical array lens in a direction perpendicular to an optical axis of the incident light.

25. The image projection system of claim 24, wherein the scrolling unit further comprising:

a second cylindrical array lens, separated from the first cylindrical array lens, including a plurality of adjacently disposed cylindrical lenses converging and diverging light, incident on the second cylindrical array lens, independently; and

a second driving unit providing a driving force reciprocatingly-driving the second cylindrical array lens in a direction perpendicular to an optical axis of the light incident on the second cylindrical array lens.

26. The image projection system of claim 25, wherein each of the first and second cylindrical array lenses is a diffraction optical element having a predetermined diffraction pattern.

27. The image projection system of claim 18, wherein the scrolling unit comprises:

a turning cylinder array lens, rotatably disposed along an optical path of light incident on the scrolling unit, including a plurality of adjacently disposed cylindrical lenses, along an outer circumference portion of the turning cylinder array lens, having a cylinder shape; and

a driving unit rotatably driving the turning cylinder array lens.

28. The image projection system of claim 27, wherein the turning cylinder array lens is a diffraction optical element, forming the plurality of cylindrical lenses using a diffraction pattern.

29. The image projection system of claim 18, further comprising a relay lens transferring light passing through the uniform light forming unit to a predetermined position.

30. The image projection system of claim 18, wherein the uniform light forming unit comprises:

a first fly eye lens having a plurality of convex portions, two-dimensionally arranged on an incident surface and/or an emitting surface of the uniform light forming unit; and

a second fly eye lens, disposed adjacent to the first fly eye lens, having a plurality of convex portions, two-dimensionally arranged on the incident surface and/or the emitting surface of the uniform light forming unit.

31. The image projection system of claim 18, wherein the predetermined wavelength bands consist of three separate predetermined wavelength bands for three separate colors.